REMARKS

The Office Action dated July 3, 2002, has been carefully considered. In response thereto, the present application is considered to be in condition for allowance. Accordingly, reconsideration and withdrawal of the Office Action and issuance of a Notice of Allowance are respectfully solicited.

At the outset, the Applicants note that in the corresponding PCT international application no. PCT/CA01/00524, claims 11, which are identical to claims 1-11 in the present U.S. application, have been made the subject of an entirely favorable International Preliminary Examination Report (IPER). A copy of the IPER is attached.

The Applicants hereby affirm the election of claims 1-16 without traverse. Non-elected claims 17-21 have been canceled. The Applicants reserve the right to file divisional and continuation applications to prosecute the subject matter of canceled claims 17-21 and whatever other subject matter is disclosed.

The Applicants respectfully traverse the rejection of claims 1-16 under 35 U.S.C. §112, second paragraph. The terms considered clear will be understood by those skilled in the art, since they either are terms of art or are defined in the specification. Therefore, the Applicants respectfully submit that the claims are as clear as the statute requires, namely, that a person having ordinary skill in the art who had reviewed the specification could determine what is claimed.

The Applicants further traverse the rejection of claims 1-4 and 8-16 under 35 U.S.C. §103(a) over *Takiguchi et al* in view of *Haysom et al* and *Elman et al*.

The Office Action cites *Takiguchi et al* only for teaching of a quantum well structure comprising an InGaAsP quantum well active region and an InP containing layer. The Office

Action relies on the other two references for teaching to provide the vacancy type defects and the interstitial type defects and to inter-diffuse such defects by rapid thermal annealing. In response, the Applicants respectfully submit that the combination of references proposed in the Office Action is based on hindsight reconstruction of the invention.

Each of the references teaches a different technique for controlling the characteristics of the quantum well structure. *Takiguchi et al* controls strain through the lattice constants of the layers in the quantum well active region. *Elman et al* teaches forming a disordered region and annealing the structure to diffuse the vacancies and defects; the areas not to be implanted are masked; and RTA using the enhanced overpressure proximity technique is carried out at 950°C. *Haysom et al* uses repeated isothermal anneals at lower temperatures (e.g., 650 or 725°C) and cautions against RTA at temperatures which are too high.

There is no teaching or suggestion in the applied references that they even could have been combined as suggested in the Office Action, much less that there would have been any benefit in doing so. In fact, the different approaches to temperature taken by *Elman et al* and *Haysom et al* provide strong teaching away from combining the references as suggested in the Office Action.

Another reason why the applied references teach away from combining them as suggested in the Office Action is the different growth processes taught in *Elman et al* and *Haysom et al*. As acknowledged in the Office Action, *Elman et al* teaches molecular beam epitaxy (MBE). By contrast, *Haysom et al* teaches chemical beam epitaxy (CBE). The references do not teach or suggest that the techniques taught therein could have been combined, much less that there would have been any desirability in doing so. In fact, the two different

techniques are the reason for the above-noted widely different temperature ranges taught in the two references.

Further, the present claimed invention offers the following advantages over the combination of references suggested in the Office Action. With regard to the claims reciting molecular beam epitaxy, the temperatures required are much lower even than those required for the CBE of *Haysom et al;* therefore, the process of the present claimed invention is more efficient. Such a lower temperature is recited in new claim 22, although it is an advantage flowing from the subject matter of the independent claims as well. Advantages of the lower temperature are described in the originally filed specification, e.g., at the bottom of page 9.

Another advantage is that the present claimed invention achieves QWI with a much thinner layer of InP than *Haysom et al* requires. The reference uses InP layers of at least a micron in thickness to get a useful change in the wavelength emitted. That thickness is disadvantageous, not only because of the amount of material used, but also because the very thick layer would make the process mostly impractical for use in device fabrication and integration. By contrast, the present claimed invention permits the use of much thinner layers, such as those recited in new claims 23 and 24, thus avoiding those difficulties.

With regard to claims 15 and 16, the Applicants respectfully submit that the subject matter of those claims is misrepresented in the Office Action. The range of 0-140 nm is not recited in those claims as a range of thicknesses of the InP layer, but as a range of changes of the bandgap energy. The Office Action alleges that "these thicknesses are in common use in similar devices in the art . . . ." Even if that is true, and the Office Action cites no prior art to that effect, the prior art would still not have taught or suggested such a range of changes of the bandgap

energy within the context of the present claimed invention. Therefore, a *prima facie* case of obviousness has not been made with regard to claims 15 and 16.

Finally, the Examiner rejects claims 5-7 under 35 U.S.C. §103(a) over *Takiguchi et al* in view of U.S. Patent No. 5,923,968 to *Yamazaki et al*. The Applicants respectfully traverse that ground of rejection for the following reasons. Claims 5-7 all depend from claim 4, which depends from claim 1. Since claims 1 and 4 were rejected under 35 U.S.C. §103(a) over *Takiguchi et al* in view of *Haysom et al* and *Elman et al*, the Office Action does not explain how claims 5-7 can be rejected under *Takiguchi et al* in view of *Yamazaki et al* without *Haysom et al* or *Elman et al*. Furthermore, *Yamazaki* et al provides no teaching or suggestion that helium-plasma-assisted MBE used to form one layer would have any beneficial effects in the diffusion of defects to another layer. Therefore, the proposed combination of references would not have taught or suggested the present claimed invention. Finally, since claim 1 has been shown above to be patentable, claims 5-7 are also patentable for at least the same reasons.

For the reasons set forth above, the Applicants respectfully submit that the present claimed invention is patentable over the combinations of references set forth in the Office Action.

As all grounds of objection and rejection have been addressed and overcome, issuance of a Notice of Allowance of claims 1-23, as now presented, is respectfully solicited.

In the event there are any questions relating to this Response or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

Please charge any shortage of fees or credit any overpayment thereof to BLANK ROME COMISKY & McCAULEY LLP, Deposit Account No. 23-2185 (115354-00116). In the event

that a separate Petition for an Extension of Time is required to render this submission timely and either does not accompany this Response or is insufficient to render this Response timely, the Applicant herewith petitions under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,

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